

SAMSUNG

Network Printer User's Guide

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United States of America

Federal Communications Commission (FCC)

Intentional emitter per FCC Part 15

Low power, Radio LAN type devices (radio frequency (RF) wireless communication devices), operating in the 2.4 GHz/5 GHz Band, may be present (embedded) in your printer system. This section is only applicable if these devices are present. Refer to the system label to verify the presence of wireless devices.

Wireless devices that may be in your system are only qualified for use in the United States of America if an FCC ID number is on the system label.

The FCC has set a general guideline of 20 cm (8 inches) separation between the device and the body, for use of a wireless device near the body (this does not include extremities). This device should be used more than 20 cm (8 inches) from the body when wireless devices are on. The power output of the wireless device (or devices), which may be embedded in your printer, is well below the RF exposure limits as set by the FCC.

This transmitter must not be collocated or operation in conjunction with any other antenna or transmitter.

Operation of this device is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation of the device.



Wireless devices are not user serviceable. Do not modify them in any way. Modification to a wireless device will void the authorization to use it. Contact manufacturer for service.




FCC Statement for Wireless LAN use:

“While installing and operating this transmitter and antenna combination the radio frequency exposure limit of 1mW/cm² may be exceeded at distances close to the antenna installed. Therefore, the user must maintain a minimum distance of 20cm from the antenna at all times. This device can not be collocated with another transmitter and transmitting antenna.”

European Radio Approval Information

(for products fitted with EU-approved radio devices)

This Product is a printer; low power, Radio LAN type devices (radio frequency (RF) wireless communication devices), operating in the 2.4 GHz/5 GHz band, may be present (embedded) in your printer system which is intended for home or office use. This section is only applicable if these devices are present. Refer to the system label to verify the presence of wireless devices.

Wireless devices that may be in your system are only qualified for use in the European Union or associated areas if a CE mark with  a Notified Body Registration Number and the Alert Symbol is on the system label.

The power output of the wireless device or devices that may be embedded in your printer is well below the RF exposure limits as set by the European Commission through the R&TTE directive.

European States qualified under wireless approvals:

EU Austria, Belgium, Denmark, Finland, France (with frequency restrictions), Germany, Greece, Ireland, Italy, Luxembourg, The Netherlands, Portugal, Spain, Sweden and the United

Accept EU Iceland, Liechtenstein, Norway and Switzerland

European States with restrictions on use:

EU In France, the frequency range is restricted to 2446.5-2483.5 MHz for devices above 10 mW transmitting power such as wireless

Accept EU No limitations at this time.

Regulatory Compliance Statements

Wireless Guidance

Low power, Radio LAN type devices (radio frequency (RF) wireless communication devices), operating in the 2.4 GHz/5 GHz Band, may be present (embedded) in your printer system. The following section is a general overview of considerations while operating a wireless device.

Additional limitations, cautions, and concerns for specific countries are listed in the specific country sections (or country group sections). The wireless devices in your system are only qualified for use in the countries identified by the Radio Approval Marks on the system rating label. If the country you will be using the wireless device in, is not listed, please contact your local Radio Approval agency for requirements. Wireless devices are closely regulated and use may not be allowed.

The power output of the wireless device or devices that may be embedded in your printer is well below the RF exposure limits as known at this time. Because the wireless devices (which may be embedded into your printer) emit less energy than is allowed in radio frequency safety standards and recommendations, manufacturer believes these devices are safe for use. Regardless of the power levels, care should be taken to minimize human contact during normal operation.

As a general guideline, a separation of 20 cm (8 inches) between the wireless device and the body, for use of a wireless device near the body (this does not include extremities) is typical. This device should be used more than 20 cm (8 inches) from the body when wireless devices are on and transmitting.

This transmitter must not be collocated or operation in conjunction with any other antenna or transmitter.

Some circumstances require restrictions on wireless devices. Examples of common restrictions are listed below:



Radio frequency wireless communication can interfere with equipment on commercial aircraft. Current aviation regulations require wireless devices to be turned off while traveling in an airplane. IEEE 802.11 (also known as wireless Ethernet) and Bluetooth communication devices are examples of devices that provide wireless communication.



In environments where the risk of interference to other devices or services is harmful or perceived as harmful, the option to use a wireless device may be restricted or eliminated. Airports, Hospitals, and Oxygen or flammable gas laden atmospheres are limited examples where use of wireless devices may be restricted or eliminated. When in environments where you are uncertain of the sanction to use wireless devices, ask the applicable authority for authorization prior to use or turning on the wireless device.



Every country has different restrictions on the use of wireless devices. Since your system is equipped with a wireless device, when traveling between countries with your system, check with the local Radio Approval authorities prior to any move or trip for any restrictions on the use of a wireless device in the destination country.



If your system came equipped with an internal embedded wireless device, do not operate the wireless device unless all covers and shields are in place and the system is fully assembled.



Wireless devices are not user serviceable. Do not modify them in any way. Modification to a wireless device will void the authorization to use it. Please contact manufacturer for service.



Only use drivers approved for the country in which the device will be used. See the manufacturer System Restoration Kit, or contact manufacturer Technical Support for additional information.

1 Getting started

Introduction

The Samsung Network Printer Card allows you to connect your printer directly to a network physically or wirelessly to share the printer among multiple users. Once the card has been installed, the printer is ready to function as a network print server supporting various network environments, such as Windows 98/Me/NT/2000/XP/2003, Novell NetWare, UNIX, Linux, and Macintosh 8.6 or higher.

This guide explains how to install the Samsung Network Printer Card and set up your printer as a print sever over the network.

This guide assumes that you have:

- A good working knowledge of your network utilities
- A supported network operating system
- A fully operational computer system
- Access to the supervisor account as a network administrator, or access to an account that has supervisor and print server operator privileges

Supported network environments

Administrators and users can configure, and use printers on the following supported network operating systems:

Operating system	Network environment	Printing protocol	Action
Windows	98, NT, ME, 2000, XP, 2003	TCP/IP, LPD (LPR), IPP, IPX/SPX, Bonjour	See Chapter 3, "TCP/IP environment."
Linux	Red Hat 8.0 ~ 9.0, Fedora Core 1 ~ 3, Mandrake 9.0 ~ 10.2, SuSE 8.2 ~ 9.2	TCP/IP, LPD (LPR)	See Chapter 3, "TCP/IP environment."

Operating system	Network environment	Printing protocol	Action
Unix	AT&T system V (Rel 4.2), BSD4.3, HP-UX (Rel 9.x & Rel 10.x), SCO 5.x, SUNOS 5.5, Sparc or Solaris 2.5.	TCP/IP, LPD (LPR)	See Chapter 3, "TCP/IP environment."
Novell NetWare	NetWare versions 3.x, 4.x, 5.x, 6.x	IPX/SPX	See Chapter 4, "NetWare environment."
Macintosh	Macintosh 8.6 ~ 9.2, 10.1 ~ 10.3, or higher	TCP/IP, EtherTalk, Bonjour	See Chapter 5, "EtherTalk environment."

NOTE: Your printer may not support all of the listed computing environments (operating systems). Therefore, check the network environment your printer supports in the user's guide that came with the printer.

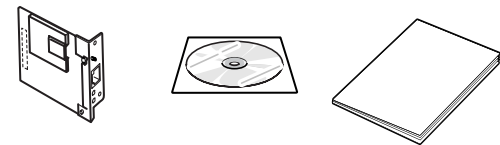
Samsung Network Printer Card

Your printer may or may not have built-in network capabilities, depending on the model. If not, a networking package must be purchased and installed to enable network printing. The printer card shape and content may vary, depending on the package purchased.

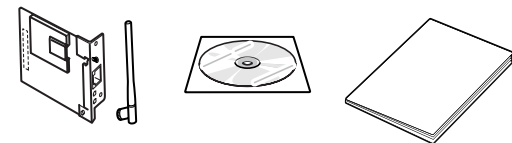
Package contents

When unpacking your network printer card, you should find the following items. Depending on your particular card type (wired or wired/wireless), some items may be different.

- Wired Network Printer Card



- Wired / Wireless Network Printer Card



System requirements

The following hardware is required to configure a Samsung printer for network applications.

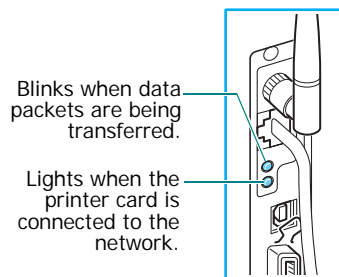
Computer	Requirements
IBM - compatible PC	<ul style="list-style-type: none">• 80486 CPU or higher• Minimum of 16 MB of RAM• 2 MB of free disk space
Macintosh	<ul style="list-style-type: none">• PowerPC 68020 or higher• Minimum of 8 MB of RAM• 2 MB of free disk space

Installing your Network Printer Card

Before installing the Samsung Network Printer Card, you must have administrator or root privileges on the local system.

- 1 Install the network printer card in the printer. For details, refer to your printer user's guide.
- 2 Use a twisted pair cable with an RJ-45 connector to connect the printer to your network.

Once a connection is established between the network printer card and your network, the LEDs on the card light green.



- 3 Set up your printer's IP address. See "IP address setup" on page 2.2.

2 Programs supplied on the Network Utilities CD

The CD-ROM supplied with your printer card provides you with:

- **SyncThru Web Admin Service:** A web-based printer management solution for network administrators. It provides you with an efficient way of managing network printers and lets you remotely monitor and troubleshoot network printers from any site with corporate intranet access.
- **SetIP:** A utility program allowing you to select a network printer card and manually configure the addresses for use with the TCP/IP protocol.

System requirements

To install SyncThru Web Admin Service and SetIP, the following are required:

- Operating system: Windows 2000/XP/2003
- Computer/Processor: 133 MHz or faster Pentium-compatible processor
- Memory: 256 MB (recommended)
- Hard Disk space: 2 GB hard disk with 1.5 GB available hard-disk space
- Internet Explorer 5.5 or later, or Mozilla 1.0

Installing software

- 1 Insert the supplied CD-ROM into your CD-ROM drive.
The CD-ROM will automatically run. If it does not, click **Start → Run**, enter **x:/cdsetup.exe** (**x** represents your CD-ROM drive), and click **OK**.
- 2 Select the language you want.
- 3 Click **Install SyncThru Web Admin Service** or **Install SetIP**.
- 4 Follow the onscreen instructions to complete installation.
- 5 Click **Finish** when installation is done.

Uninstalling software

You should remove the Network utilities if you are upgrading the software or if the installation fails.

NOTE: Close all programs before uninstalling software.

- 1 Click **Start → Programs → Samsung Network Utilities → SetIP** or **SyncThru Web Admin Service → Uninstall SetIP** or **Uninstall SyncThru Web Admin Service**.
- 2 Click **OK** to confirm uninstallation.
- 3 Click **Finish** when uninstallation is done.

Viewing the SyncThru Web Admin Service User's Guide

The user's guide for SyncThru Web Admin Service in HTML format is installed on the Windows Start menu automatically with the program. It provides you with quick and easy access to the topic you want. Refer to the user's guide any time you need help while using the program.

To open the SyncThru Web Admin Service User's Guide, click **Start → Programs → Samsung Network Printer Utilities → SyncThru Web Admin Service → User's Guide**.

IP address setup

Before using your network print server in your network, you must set TCP/IP addresses for the print server. You will need your printer card's MAC address, IP address, subnet mask, and gateway address. First, check with your network administrator for the TCP/IP addresses.

NOTE: The MAC address is the hardware serial number of the network printer card. You can check the address by printing the Network Printer Configuration Page. For printing the page, refer to your printer user's guide.

You can set your print server's IP address via the following methods:

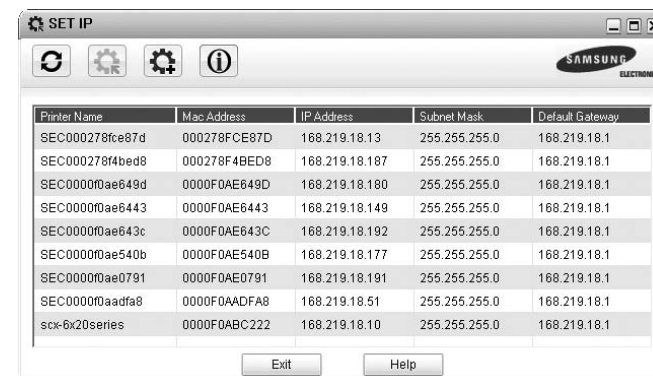
- Printer control panel: If your printer has a control panel and the network configuration menu, you can set the IP address directly from the printer. Refer to your printer user's guide.
- SetIP program: Go to the **Using SetIP**.
- SyncThru Web Admin Service: Go to the **Using SyncThru Web Admin Service**.
- SyncThru Web Service: Once you have set an IP address for your network print server, you can use the embedded web server in the network printer card to change the address. Go to page 2.3.
- DHCP: You can use Dynamic Host Configuration Protocol (DHCP) to get an IP address automatically assigned by your network administrator, if your network system supports this protocol.
- BOOTP: A network-based server using the Bootstrap protocol (BOOTP) can notify the network printer card of its assigned IP address each time the printer turns on, if your network system supports this protocol.



NOTE: To get an IP address from the DHCP or BOOTP server, the IP assignment method must be set to DHCP or BOOTP.

Using SetIP

- 1 From the Windows Start menu, select **Programs** → **Samsung Network Printer Utilities** → **SetIP** → **SetIP**.

The program automatically detects and displays new and configured print servers on your network.

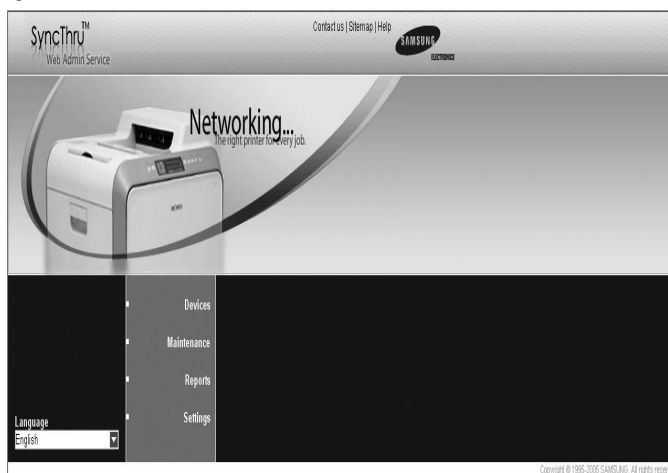


- 2 Select the name of your printer and click . If you cannot find your printer name, click  to refresh the list. Even with this step, if you cannot find your printer name, then contact Network Administrator.
- 3 Enter your network printer card's MAC address (hardware address), IP address, subnet mask, default gateway, and then click **Apply**.
- 4 Click **OK** to confirm the settings.
- 5 Click **Exit** to close the SetIP program.

Using SyncThru Web Admin Service

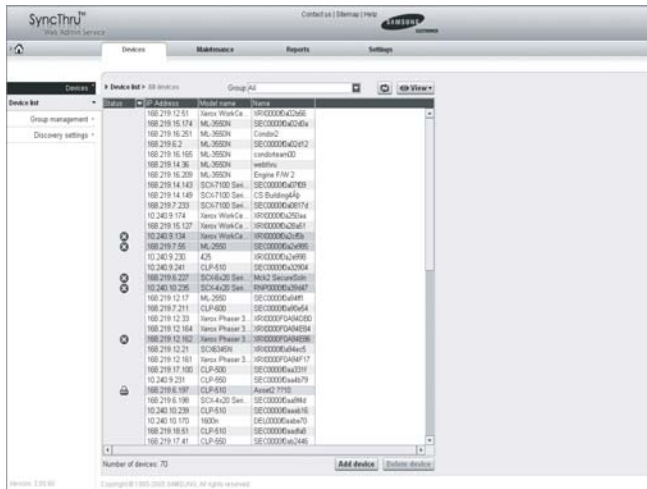
- 1 From the Windows Start menu, select **Programs** → **Samsung Network Printer Utilities** → **SyncThru Web Admin Service** → **SyncThru Web Admin Service**.

The homepage of SyncThru Web Admin Service opens in your default web browser.



- 2 If necessary, change the display language.

- 3 Click **Devices** → **Add device**.



If you click Devices, SWAS would search out the printer connected to network. Thus you need to wait for a while.

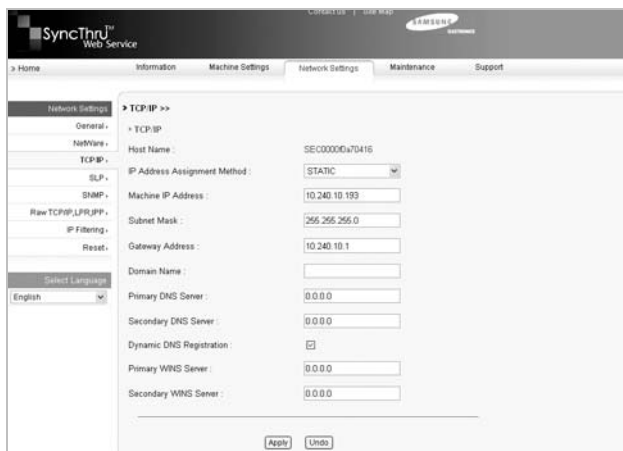
- 4 Enter the IP address or DNS name of the network printer card and click **OK**.

Your network print server is added to the device list.

NOTE: You can set SyncThru Web Admin Service to automatically detect print servers on the network. From the Devices page, click **Discover settings** and set the discovery method and schedule. For details, see the SyncThru Web Admin Service User's Guide.

Using SyncThru Web Service

- 1 Run your web browser.
- 2 Enter your print server's IP address in the URL field and click **Go**.
- 3 Click **Network Settings** → **TCP/IP**.
- 4 Select **Static** from **IP Address Assignment Method**.



- 5 Enter your print server's TCP/IP addresses and click **Apply**.

3 TCP/IP environment

A TCP/IP network provides you with various protocols for using printing devices and managing various types of networked devices.

In this chapter, you will learn which management protocols are available in TCP/IP network environments, and how to print via your network print server using TCP/IP protocol.

Management protocols

Before beginning to print documents via your network printer, you need to check or configure some parameters using management protocols.

DHCP/BOOTP

Dynamic Host Configuration Protocol (DHCP) is a communication protocol enabling network administrators to centrally manage and to automate the assignment of IP addresses in a network. In an IP network, each device needs a unique IP address. DHCP lets a network administrator supervise and distribute IP addresses from a central point and automatically sends a new IP address when a device is plugged into a different place in the network.

Bootstrap Protocol (BOOTP) is UDP/IP-based protocol which allows a booting host to configure itself dynamically and without user supervision. BOOTP provides means to notify a host of its assigned IP address, the IP address of a boot server host, and other configuration information, such as the local subnet mask, the local time offset, and the addresses of default routers. Addresses of various Internet servers can also be transferred to a host using BOOTP.

DHCP is active by factory default on your network print server. After boot up, the network print server will get an IP address automatically from the DHCP server, if one exists. To set an IP address manually, see page 2.2.

Configuring DHCP/BOOTP

To enable or disable DHCP/BOOTP, use one of the following methods:

- **Printer's control panel:** Refer to Network Menu settings in your printer user's guide.
- **SyncThru Web Service:** Select **Network Settings** → **TCP/IP** and select **DHCP** or **BOOTP** from the IP Address Assignment Method list.

HTTP

Hypertext Transfer Protocol (HTTP) is an application layer protocol for distributed, collaborative, hypermedia information systems. It is a generic, stateless protocol which can be used for many tasks beyond its use for hypertext, such as with name servers and distributed object management systems. You are using HTTP when you connect your network printer via a web browser.

The Samsung Network Printer Card has a built-in web server, SyncThru Web Service. You can configure and manage your network print server through SyncThru Web Service using HTTP over TCP/IP.

SNMP

Simple Network Management Protocol (SNMP), which is part of the TCP/IP protocol suite, is an application layer protocol that facilitates the exchange of management information between network devices. It enables network administrators to remotely monitor and configure network devices, find and solve network problems, and plan for network growth.

Network devices are monitored and controlled using four basic SNMP commands:

- **read:** is used by a Network Management server to monitor network devices. The server examines different variables that are maintained by the devices.
- **write:** is used by a Network Management server to control managed devices. The server changes the values of variables stored within the devices.
- **trap:** is used by network devices to asynchronously report events to a Network Management server. When certain types of events occur, a device sends a trap to the specified server.
- **Traversal operations:** are used by a Network Management server to determine which variables a network device supports and to sequentially gather information in variable tables, such as a routing table.

Configuring SNMP

To access your network print server using SNMP, Community Name/Access Permission pair must be properly specified. There are two access permission: read and write.

Assign the IP addresses of trap hosts and community names (IP addresses) of network devices in SyncThru Web Service; select **Network Settings** → **SNMP**.

Using SNMP

SyncThru Web Service accesses, configures, and manages network devices using SNMP. You can use other MIB (Management Information Base) browser software, which allows you to access management information gathered from network devices.

SLP

Service Location Protocol (SLP) is an Internet standard network protocol that provides a framework to allow networking applications to discover the existence, location, and configuration of networked services in enterprise networks, such as printers, Web servers, fax machines, video cameras, file systems, backup devices (tape drives), databases, directories, mail servers, and calendars.

In order to locate services on the network, users of network applications are required to supply the host name or network address of the device that supplies a desired service. However, SLP eliminates the need for a user to know the name of a network host supporting a service. Rather, the user only needs to supply the desired type of service and set of attributes or keywords, which describe the service.

Based on that description, SLP also resolves the network address of the service of the user. Administrators do not need to help clients find new services or to remove services when they are no longer available. SLP uses multicasting and can work over subnet boundaries.

Configuring SLP

You can configure SLP protocol settings through SyncThru Web Service. Select **Network Settings** → **SLP**.

- **SLP Protocol:** You can enable or disable SLP.
- **Port Number:** The port number is fixed to 427.
- **Scope 1 ~ 3:** A scope is a set of services and a string used to group resources by location, network, or administrative category. Each scope should not be more than 32 characters.
- **Message Type:** You can select the outgoing SLP message type sent to network devices. The default value is **Multicast**.
- **Multi Cast Radius:** You can specify the maximum number of subnets that SLP multicasts can travel across. This value is also called the “hop count” or “time-to-live” (TTL). The default value is 255.
- **Registration Lifetime:** You can define the time in seconds before the Server Agents registration expires.
- **Multicast Address:** The Multicast Address value is fixed to 239.255.255.253, 224.0.1.127.

Using SLP

Once **SLP enabled** is checked, the network print server works as a Service Agent and the User Agent, for example, SyncThru Admin Service, searches for the network print server by SLP Protocol.

Dynamic DNS (DDNS)

DNS (Domain Name System) is used for registration of domain names and provides Host names to an IP address resolution service. For printer devices, DNS may be utilised for printer domain name registration, so that print server clients may refer to the printer by its host name rather than by its IP address. Even though a printer's IP address is changed, all clients can operate this printer without reconfiguration. Addressing to a printer device by IP address is not convenient and may often go stale if an IP address to a device is assigned dynamically via a DHCP server. If the DHCP server can provide information about a printer's changing IP address to the DNS server automatically, user convenience is increased. The printer's name will be used as its DNS name.

Configuring DDNS

- 1 Let the DHCP server provide updated information to the DNS server.
- 2 Configure the same DDNS domain through SyncThru Web Service as entered in the DNS server.

If you connect your network printer via a web browser, you can enable this by selecting **Network Setting** → **TCP/IP** → **Dynamic DNS Registration**.

- 3 Set the IP assignment method of your network print server to **DHCP** and reboot the printer.

The DNS server will update its database and users can use the printer's name instead of its IP address.

WINS

Before Dynamic DNS was defined, DNS could only be updated manually when DHCP servers automatically provided (or removed) IP addresses. As a result, DNS servers often contained obsolete listings. In response, Microsoft developed Windows Internet Name Service (WINS) to solve this problem for NetBIOS names.

Microsoft now recommends moving to Dynamic DNS and away from WINS. However, many customers including Microsoft maintain WINS systems and need devices to interoperate with WINS. So devices must, at least for now, support WINS interoperability to allow for dynamic NetBIOS name to IP address registration and resolution.

WINS provides a distributed database for registering and querying dynamic NetBIOS names to IP address mapping in a routed network environment. This is the best choice for NetBIOS name resolution in such a routed network because it is designed to solve the problems that occur with name resolution in complex Internet networks.

Configuring WINS

Access SyncThru Web Service and select **Network Settings** → **TCP/IP**. You will configure two WINS server addresses, the Primary WINS Server or the Secondary WINS Server. The default value is 0.0.0.0.

In a DHCP server

A DHCP server can support the NBNS (NetBIOS Name Server) option. An administrator has to set the WINS server IP address in the NBNS option.

1 Set the IP assignment method of your network print server to **DHCP**.

2 Reboot the print server.

The WINS server will update the printer's NetBIOS name in its database. Users can use the printer name instead of its IP address.

In the network print server

1 Configure the WINS server address through SyncThru Web Service or SyncThru Web Admin Service.

2 Reboot the print server.

The WINS server will update the printer's NetBIOS name in its database. Users can use the printer name instead of its IP address.

Bonjour

Bonjour allows for a network system to be easily discovered and its capabilities to be revealed by any Bonjour-compliant client software, such as Print Center Utility built in to Mac OS X. For details, see page 5.2.

UPnP

UPnP is an architecture for pervasive peer-to-peer network connectivity of intelligent appliances, wireless devices, and PCs of all form factors. It is designed to bring easy-to-use, flexible, standards-based connectivity to ad-hoc or unmanaged networks whether in the home, in a small business, public spaces, or attached to the Internet.

UPnP is a distributed, open networking architecture that leverages TCP/IP and Web technologies to enable seamless proximity networking in addition to control and data transfer among networked devices in the home, office, and public spaces.

UPnP is more than just a simple extension of the plug and play peripheral model. It is designed to support zero-configuration, "invisible" networking, and automatic discovery for a wide breadth of device categories from a wide range of vendors. This

means a device can dynamically join a network, obtain an IP address, convey its capabilities, and learn about the presence and capabilities of other devices. DHCP and DNS servers are optional and are used only if available on the network, while a device can leave a network smoothly and automatically without leaving any unwanted state issues behind.

UPnP supports 6 protocol stacks for addressing, discovery, description, control, eventing, and presentation, but the Samsung Network Printer Card supports only Simple Service Discovery Protocol (SSDP) which allows addressing, description, and discovery.

Configuring UPnP

- Control panel: Refer to the Network Menu setting in your printer user's guide.
- SyncThru Web Service: Select **Network Settings** → **UPnP**.
 - **Auto IP Enabled**: You can enable or disable Auto IP. When this option is selected, the network print server cannot find the control point and receive an IP address from the control point. The network print server will create an IP address of "169.254.XXX.XXX."
 - **Multicast DNS Enabled**: SSDP can use Multicast DNS.
 - **SSDP Enabled**: You can enable or disable SSDP.
 - **SSDP TTL**: You can specify the maximum number of subnets that SSPD multicasts can travel across.

Using UPnP

If SSDP (Simple Service Discovery Protocol) is enabled, your network print server is checked by a control point. This control point is an application which supports finding UPnP devices. Information on searching and control functions or your network print server's device information is displayed in an XML page (<http://xxx.xxx.xxx.xxx:5200/printer.xml>).

Printing protocols

Before setting the network printing ports, you must install the printer driver with the local port (LPT) on the system. Refer to your printer user's guide.

Standard TCP/IP port

You can print your documents to your Samsung network printer by creating a Standard TCP/IP port.

Configuring Standard TCP/IP in Windows 2000/XP/2003

You can enable or disable the Standard TCP/IP Printing port through SyncThru Web Service. Select **Network Settings** → **Raw TCP/IP, LPR, IPP**.

You can also change the port number of the Standard TCP/IP port. The default port number is 9100.

Creating a Standard TCP/IP port

- 1 In Windows XP, click **Start** → **Printers and Faxes**. In Windows 2000/2003, click **Start** → **Settings** → **Printers**.
- 2 Click **Add a printer** or double-click **Add Printer**, and then **Next**.
- 3 Click **Local printer attached to this computer** and then **Next**.
Make sure that **Automatically detect and install my Plug and Play printer** is not selected.
- 4 Click **Create a new port**, select **Standard TCP/IP port** from the Type of port list, and click **Next**.
- 5 Click **Next**.
- 6 Enter the IP address or DNS name of your network printer and click **Next**.
For the port name, a default name will be entered by Windows. You can change it to a more user-friendly name.
- 7 Follow the instructions on the screen to complete installation.
Now, you can select your printer from the Print Setup dialogue box.

LPR port

LPD, Line Printer Daemon, is the protocol associated with line-printer spooling services. Users can use the printing service from LPD running on a Samsung network print server through the LPR port. Most operating systems, such as Microsoft Windows NT/2000/XP/2003, Linux, and Unix, support LPR port printing.

Configuring an LPR port

You can enable or disable the LPR Printing port through SyncThru Web Service. Select **Network Settings** → **RawTCP/IP, LPR, IPP**. You can also change the port number of LPR/LPD. The default port number is 515.

In Windows NT

Before adding an LPR printing port, make sure that Microsoft TCP/IP printing service is installed on your Windows NT computer, or install the software, if necessary.

Installing the TCP/IP printing service

- 1 Make sure your computer supports Microsoft TCP/IP printing service.
 - 1) From the Windows Start menu, select **Settings** → **Control Panel**.
 - 2) Double-click **Network**.
 - 3) Make sure that **TCP/IP protocol** is listed in the Protocols tab and Microsoft TCP/IP printing is listed in the **Services** tab. If not, go to step 2.
- 2 Install TCP/IP printing service:
Click **Add** and select **TCP/IP Protocol** → **Microsoft TCP/IP Printing**. Follow the onscreen instructions to complete installation.

NOTES:

- During the installation process, you may need the Windows Installation CD-ROM.
 - You can only install Microsoft TCP/IP Printing if you have administrator privileges.
-

After installing the service, restart your computer.

Adding an LPR port

- 1 From the Windows Start menu, select **Settings** → **Printers**.
- 2 Click **Add Printer**.
- 3 Click **My Computer** and then **Next**.
- 4 Click **Add Port** and select **LPR Port** from the port type list.

- 5 Click **New Port**.
- 6 Enter the IP address or DNS name of the printer and the name of a user-defined print queue.
- 7 Click **OK**.
- 8 Follow the onscreen instructions to complete installation.

In Windows 2000/XP/2003

To add an LPR port to Windows 2000/XP/2003, users must install a Standard TCP/IP port by default, then change the printing protocol in the printer properties. For installing the Standard TCP/IP port, see page 3.4.

- 1 From the Windows Start menu, select **Settings** → **Printers**, or **Printers and Faxes**.
- 2 Right-click the printer you want and select **Properties**.
- 3 Click **Ports**.
- 4 Make sure that the appropriate Standard TCP/IP port is selected and click **Configure Port**.
- 5 Select **LPR** from the Protocol section.
- 6 Enter the print queue name and click **OK**.
- 7 Click **OK** to close the properties window.

In Unix

Depending on your particular Unix system, LPD configuration may vary. See your system documentation for the correct syntax for the system.

Samsung Printer Port

A Samsung Network Printer port is used to send print jobs from network computers running Windows OS that do not support the Standard TCP/IP port or LPR port. Adding a Samsung Network Printer port

- 1 From the Windows Start menu, select **Settings** → **Printers**.
- 2 Right-click the printer you want and select **Properties**.
- 3 Open the **Details** tab and click **Add Port**.
- 4 Select **Samsung Network Printer Port** from the Other list and click **OK**.
- 5 Select the print server you want to use and click **OK**.
If you cannot find the print server, click **Add New Print Server to list**, specify information for the print server, such as print server name, IP address, IPX address, or MAC address, and click **OK**.

- 6 When the port name displays in the Print to the following port list, click **OK** or **Close**.

IPP port

Internet Printing Protocol (IPP) allows printing across the Internet, meaning that you can send a print job to your printer from a remote place if you are an Internet user, no matter what operating system you use or where you are.

Configuring IPP in the print server

The network administrator must specify information required for IPP, such as the URI (Uniform Resource Identifier).

- 1 Run your web browser and access SyncThru Web Service.
- 2 Click **Network Settings** → **Raw TCP/IP, LPR, IPP**.
- 3 Configure the IPP parameters:
 - **Printer Name:** Enter the network printer's name to be used with IPP printing.
 - **Printer URI:** Enter the URL of the printer using the following format: `ipp://the IP address of the printer or http://the IP address of the printer:631` (Ex: `ipp://168.10.17.82` or `http://168.10.17.82:631`) 631 is the IPP port number.
 - **Printer Information:** Enter additional information about the printer.
 - **More Printer Information:** Enter more additional information about the printer.
 - **Printer Location:** Enter the name of the location where the printer is physically located.
 - **Multiple Operation Timeout:** Enter the time to elapse before the printer ends a print job. When there is no incoming data after the specified number of seconds, the printer ends reception.
 - **Time to Keep Jobs in History:** Set the length of time the IPP printer keeps job information.
 - **Operator Message:** Enter printer information for printer users.
 - **Job Count:** shows the number of print jobs.
 - **Driver Installer:** shows the URL where you can get the driver installer.
 - **Manufacturer:** shows the URL where you can get manufacturer information.
- 4 Click **Apply**.

Configuring a Windows client

After the network administrator has configured the network print server, each printer user must install the printer driver and set the print port to Samsung IPP 1.1 Port Monitor.

NOTE: Before following the steps below, each printer user should install the printer driver. If the printer driver is not already installed on the computer, install the printer driver that came with the printer. Select the local port (LPT) when you install the driver.

- 1 From the Windows Start menu, select **Settings** → **Printers**, or select **Printers and Faxes**.
- 2 Right-click the printer you want and select **Properties**.
- 3 In Windows 95/98/Me, click **Details**.
In Windows NT4.0/2000/XP/2003, click **Ports**.
- 4 Click **Add Port**.
- 5 Select **Samsung IPP Port** from the Other list and click **OK**.
- 6 Enter the printer URL and port name and click **OK**.
- 7 When the port name displays on the print port list, click **OK**.
Now you can select the network print server from the Print Setup dialogue box to send a job.

Setting IPP security

SyncThru Web Service allows administrators to choose an authentication method and to create or modify user accounts.

- 1 Run your web browser and access SyncThru Web Service.
- 2 Click **Network Settings** → **Raw TCP/IP, LPR, IPP**.
 - **Authentication:** You can set a user name and password encryption method (refer to http digest authentication in RFC).
 - **User DB:** You can set a user name and password for IPP printing. You can set up the user database for up to 10 items.
- 3 Click **Apply**.

NOTE: A user name should be unique for all slots and should not include symbols. The length of the user name and the password should each be less than 7 characters.

Additional functions

The following are additional functions you can use through SyncThru Web Service or SyncThru Web Admin Service.

Printer properties settings

You can check and modify printer and document properties for an installed printer. For properties that are not supported by the printer driver, an error message indicating that the property is not supported is displayed. These settings are used only for printing from this system to the printer. However, these settings do not affect the printer properties of the network printer.

Firmware upgrade (HTTP)

You can upgrade your printer's firmware using the HTTP protocol. First, you need to download firmware from the Samsung website (<http://www.samsungprinter.com>).

NOTE: Before upgrading the firmware, make sure that TCP/IP parameters are entered in the print server.

- 1 Run your web browser and access SyncThru Web Service.
- 2 Click **Maintenance** → **Firmware Upgrade**.
- 3 Select a firmware type, **Printer Firmware** or **Network Firmware**.
- 4 Click **Browse**, and then select the downloaded new firmware.
- 5 Click **Upgrade**.

NOTE: It takes a few minutes to upgrading the firmware. After completely upgrade, the printer will be reset.

Default setting (HTTP/SNMP)

You can reset all of your network parameter settings to their default status.

NOTE: All default parameters will be applied after the print server restarts.

IP filtering

This security feature (IP Filtering) provides the ability to prevent unauthorised network access to the network print server based on IP addresses set by a network administrator using SyncThru Web Service.

- 1 Run your web browser and access SyncThru Web Service.
- 2 Select **Network Settings** → **IP filtering**.

3 Configure an IP filter.

- **IP Filtering:** You can enable or disable IP filtering.
- **IP Address1 ~ Address10:** You can enter filtered IP addresses. Users having the IP addresses set here are able to access the network print server.

4 Click **Apply**.

Only system administrators or authorised users can set, via SyncThru Web Service, IP addresses that can access the device. Up to 10 addresses or ranges of address choices can be made and set. Authorised users are able to change the action (Apply/ Undo) and to print to the network print server.

NOTE: Ranges of addresses shouldn't contain "null" or "0.0.0.0" values.

Reset

1 Run your web browser and access SyncThru Web Service.

2 Click **Network Settings** → **Reset**.

You can reboot the network print server, if your network settings are not applied correctly or the network card is disconnected from your network.

Ethernet speed

You can set the communication speed for Ethernet connections.

1 Run your web browser and access SyncThru Web Service.

2 Click **Network Settings** → **General**.

- **Speed Rate:** Automatic, 10 Mbps(Half Duplex), 10 Mbps(Full Duplex), 100 Mbps(Half Duplex), 100 Mbps(Full Duplex). select a Ethernet speed from the drop-down list.

3 Click **Apply**.

4 NetWare environment

Samsung network printer card is compatible with Novell NetWare networks in versions 3.x, 4.x, 5.x, and 6.x. You can print to the network printer from any NetWare client that is attached to the network. This section describes how to continue printing with your network printer card in a NetWare environment.

NetWare printing

The NetWare architecture for printing is comprised of the following:

Printers

These are the physical printers, which may be attached either to NetWare file servers, NetWare machines dedicated as print servers, NetWare workstations, or directly to the network. The Samsung network printer falls into the last category.

Print queues

These queues are found on NetWare file servers where print jobs are stored before printing.

Print servers

These are programs that transfer print jobs from the print queues to the printers. Print servers may operate from various points in the NetWare network:

- They may be present on the NetWare file server (RPRINTER mode). This puts an additional load on the file server.
- They may be present on the printers themselves (PSERVER mode). This relieves the file server of a printing load and does not require any dedication of NetWare machines as print servers. Printing performance will be improved as the printer will have optimised software and hardware to accommodate network printing. Also, the print server and physical printer are in close proximity and print data need not travel over the network from print server to printer.

Additionally, printers connected to NetWare workstations may be shared with the rest of the network. This is done by running RPRINTER on the workstation and configuring the printers as Remote Printers. Print servers on the network may then interact with the RPRINTER program on the workstation for printing. Configuration for NetWare printing involves creation of printers, print queues, and print servers, and the associations between them on the NetWare file server.

The file server configuration for printers, print queues, and print servers may be achieved using NetWare supplied utilities, such as PCONSOLE and NWADMIN.

Configuring NetWare

NetWare Setup allows you to enter the names of the NetWare objects that are concerned with network print jobs. The NetWare print queues must be assigned to the NetWare print servers you have set up for printing to the network printer card. When you enable NetWare Setup, you can set up NDS (Novell Directory Services), Bindery Services, or both. NDS is used with NetWare 4.x/5.x/6.x; Bindery Services are used with NetWare 3.x or with NetWare 4.x/5.x/6.x in bindery emulation mode.

You can set up IPX/SPX in SyncThru Web Service. Select **Network Settings → NetWare**.

- **Enable/Disable Bindery:** Select this option if you have a NetWare network connected with the network print server.
- **Select Frames Types:** EtherNet_802.2/EtherNet_802.3/EtherNet_II/EtherNet_SNAP. You must select at least one frame type.
- **IPX/SPX mode configuration:** Configure IPX/SPX mode for your NetWare system.

Bindery configuration: You can set up the bindery server.

- **Bindery Setup:** Use this option if you have already configured one or more bindery servers (file servers running NetWare 3.x, or 4.x, 5.x, or 6.x in bindery emulation) with a print server and a print queue for network printing. Before entering bindery settings, The network print server connected to the network and the NetWare file server must be running. If access to the file server or print server is restricted, you need to log in to a NetWare Client system.
- **Bindery Print Server:** Enter the name of the print server that you have configured in the NetWare utility PCONSOLE. This is the print server that will route print jobs to the network print server from NetWare Client on IPX networks.
- **File Server:** Enter the name of the NetWare server on which you have configured a print server and a print queue to handle network printing.

NDS configuration: You can set up the NDS server.

- **Enable/Disable NDS:** If NetWare servers you will use to print to the network print server are running NetWare 4.x/5.x/6.x in native mode.
- **NDS Tree:** Enter the name of the NDS tree that contains the printer, print server, and print queue objects you have previously defined on the NetWare server for the network print server. Your new NDS tree selection automatically overwrites any previous tree selection. If you change the NDS tree selection and there are also current Bindery settings, you are alerted that they will be deleted. If you continue with NDS Setup, you can replace Bindery settings afterwards.
- **NDS Print Server:** Enter the name of the print server object as "name.context."

NOTE: Use NDS Setup if your network uses NetWare 4.x/5.x/6.x in native mode. Use Bindery Setup if your network uses NetWare 3.X or uses NetWare 4.x/5.x/6.x in bindery emulation mode.

Printing in NetWare

To print to your network printer on a NetWare workstation, you need to add a print queue.

NOTE: To use bindery emulation, you must log on to a Bindery server as an administrator. In the NDS mode, log on to target text of the NDS tree where you have administrator privileges.

Adding a queue

- 1 Open the NWADMIN dialogue box by double clicking on the NetWare Client.
- 2 Right-click **CONTEXT**, then choose the **create** menu.
- 3 You will need to create all of the following items:
 - Printer Server: represents a network print server.
 - Printer: represents a network printing device.
 - Printer Queue: represents a network print queue.

NOTE: The New Object dialogue box lets you choose the class of object to create.

- 4 Double-click each tree print object and select **Assignments menu**.
- 5 Click **Add**.

The print server object which was created in Step 3 has a link assigned to the printer object and the printer object a link to the print queue object.

Adding a printer

- 1 Select **Add Printer** from the **Printer and fax** menu in the control panel.
- 2 Select **Network Printer** and click **Next**.
- 3 Select **Novell Directory Service**, and then click the context tree and an existing printer object name.
- 4 Click **Next**.

- 5 If the server does not provide the printer driver or there is no one available on the network, a dialogue box appears to allow users to select a printer driver. Select the driver and click **Next**.
- 6 Install the printer driver by following the onscreen instructions.

5 EtherTalk environment

EtherTalk is AppleTalk used in an Ethernet network. This protocol is widely used in Macintosh network environments. Microsoft Windows system also supports this protocol. Like TCP/IP, EtherTalk also provides packet transmission and routing functionality.

The Samsung network printer card works on EtherTalk networks, if the host printer supports PostScript. The description in this chapter applies to network printing from a Macintosh computer.

EtherTalk printing

Printing in an EtherTalk network is possible with several different hardware and software configurations. When you issue a command to print a document, the application begins a series of EtherTalk calls attempting to establish a connection to the printer. The calls first initiate the NBP (Name Binding Protocol) name-lookup process to find the currently selected printer and its EtherTalk address. Then the Printer Access Protocol (PAP) is used to open a connection with the printer.

Once the connection has been established, the workstation and printer interact over a PAP connection. PAP uses lower-level protocols, such as ATP and DDP, to provide a data-stream service for sending print data to the printer.

Configuring EtherTalk

You can configure EtherTalk using the following methods:

Control Panel

Refer to the Network Menu setting in your printer user's guide.

SyncThru Web Service

- 1 Run your web browser.
- 2 Enter the printer's IP address in the URL field and click **Go**.
- 3 Select **Network Settings** → **EtherTalk**.
 - **EtherTalk Protocol**: allows you to enable or disable the EtherTalk protocol.
 - **Printer Name**: allows you to set the printer name for EtherTalk protocol. The default name is SEC+MAC address. This name is automatically displayed on Chooser.
 - **Printer Type**: shows the printer type.

- **Last Error Occurred**: shows the last error.
- **RTMP**: allows you to set the time in seconds after which the routing table entry maintained by the RTMP protocol times out.
- **ZIP (current zone)**: shows the AppleTalk Zone name. If there is no configured zone, *(asterisk) should be displayed.
- **PAP (wait time before transmitting a tickle packet)**: enables you to define the time interval in seconds after which the PAP protocol should resend a tickle packet to verify the status of the PAP connection between the printer and your Macintosh.

- 4 Click **Apply**.

Configuring the printer

Note: The following instructions are for Mac OS 10.3, but similar for other versions.

The following steps must be taken to configure the network printer for use on a Macintosh system. If the network printer you want to use is not listed in the printer pop-up menu when you try to print a document, you should add it to your list of available printers.

- 1 Open **System Preferences** and click **Print & Fax**.
- 2 Click **Printing** → **Set Up Printers**.
- 3 If the printer already appears in the printer list, select the **In Menu** check box to add it to your list of available printers. You will see the printer in the Printer pop-up menu the next time you print.
- 4 Choose **Printers** → **Add Printer**.
- 5 Choose **AppleTalk** from the pop-up menu list on the top.
- 6 If necessary, choose an AppleTalk zone from the pop-up menu that appears directly below it. Any AppleTalk printers in the zone you have chosen appear in the Printer List.
- 7 Select the printer in the Printer List.
- 8 To use printer-specific features, choose the item appropriate for your printer from the Printer Model pop-up menu, then select your printer in the Model Name list.
- 9 Click **Add**.

The printer appears in the Printer List as the default printer (in boldface). It also appears in the Printer pop-up menu when you print a document.

TCP/IP printing

Apple added TCP/IP printing to all versions including and after OS 8.6.

NOTE: Ensure that the Macintosh has version 8.6 or later. Earlier versions do not support TCP/IP printing as standard.

An IP printer is a network printer that uses TCP/IP protocols (such as LPD/LPR, IPP, or Socket or Jet Direct) to make itself accessible to your computer. If the IP printer you want to use is not listed when you want to print, you can add it to your list of available printers. To add an IP printer, you need to know its IP address or DNS name.

- 1 Open **System Preferences** and click **Print & Fax**.
- 2 Click **Printing → Set Up Printers**.
- 3 If the printer already appears on the Printer List, select the **In Menu** check box to add it to your list of available printers. You will see the printer in the Printer pop-up menu the next time you print.
- 4 Choose **Printers → Add Printer**.
- 5 Choose **IP Printing** from the pop-up menu.
- 6 Select the appropriate printing protocol from the Printer Type pop-up menu.
- 7 Enter the IP address or DNS name for the printer in the Printer Address field.
- 8 If your printer requires it, type the queue name for your printer in the Queue Name field.
- 9 To use printer-specific features, choose the item appropriate for your printer from the Printer Model pop-up menu, then select your printer in the Model Name list.
- 10 Click **Add**.

The printer appears on the Printer List as the default printer (in boldface). It also appears in the Printer pop-up menu when you print a document.

Bonjour printer

Usually used in Macintosh networks to search for network devices, Bonjour consists of IPv4 Link-Local Addressing, Multicast DNS, and DNS Service Discovery. Known as zero configuration networking, Bonjour uses industry standard IP protocols to allow devices to automatically find each other without the need to enter IP addresses or configure DNS servers.

In order to provide a true zero configuration experience, meaning that you do not need to configure network parameters, the printer **MUST** have Bonjour enabled by default. It is **NOT** possible to disable any part of Bonjour.

After boot up, check the Bonjour printer name of this printer network card in Mac OS X.

- 1 Open **System Preferences** and select **Print & Fax**.
- 2 Click **Printing → Set Up Printers**.
- 3 If the printer already appears on the Printer List, select the **In Menu** check box to add it to your list of available printers. You will see the printer in the Printer pop-up menu the next time you print.
- 4 Choose **Printers → Add Printer**.
- 5 Choose **Bonjour** from the pop-up menu. Any Bonjour-enabled printers on your local network or subnetwork appear on the Printer List.
- 6 Select your printer from the Printer List.
- 7 To use printer-specific features, choose the item appropriate for your printer from the Printer Model pop-up menu, then select your printer in the Model Name list.
- 8 Click **Add**.

The printer appears on the Printer List as the default printer (in boldface). It also appears in the Printer pop-up menu when you print a document.

6 Wireless network environment

Overview

The Samsung Wireless Network Printer Card supports the IEEE 802.11a/b/g standard for wireless LAN (WLAN) communications. Properly configuring your network's wireless settings on the print server will allow you to send print jobs to the print server over the WLAN. When a computer sends a file to the print server, a radio signal is transmitted. When the print server receives the incoming signal, either directly from the computer (Ad Hoc/Computer-to-Computer mode) or from an access point (Infrastructure/AirPort Network mode), it prints the file.

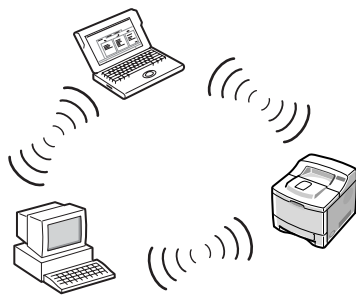
Basic concept and terms

This section provides you with information on the basic concepts and terms used for wireless networking.

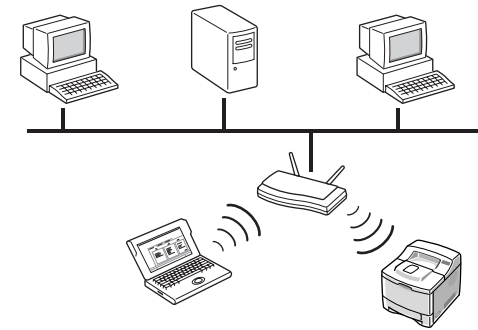
Operation mode

The Samsung Wireless Network Printer Card supports two standard wireless operation modes, Ad hoc and Infrastructure.

- **Ad hoc (peer-to-peer) mode:** Ad hoc mode is also referred to as Peer-to-peer mode. In Ad hoc mode, wireless devices or workstations communicate directly with each other, without using an access point (AP). They can share files and printers, but may not be able to access the Internet. A print server receives print jobs from wireless computers directly. On Apple networks, Ad hoc mode is called "computer-to-computer" mode.



- **Infrastructure mode:** In Infrastructure mode, wireless devices or workstations communicate with each other through an access point (AP). The access point acts like a hub, providing connectivity for wireless computers. In Infrastructure mode, wireless devices can communicate with each other or can communicate with a wired network. On Apple networks, Infrastructure mode is called Airport Network mode. In this mode, the Samsung print server receives print jobs from wireless and wired network computers through an access point.



NOTE: If you connect a network cable to the Samsung Network Printer Card, the print server will not use the wireless interface. All packets will be transferred via the wired LAN.

Access point

An access point is a device that acts as a wireless communication hub so that users of a wireless device can connect to a wired network. An access point must be able to receive and forward network traffic between wireless and cabled network devices. Multiple access points can act as repeaters to extend the range of a wireless network. To use Infrastructure mode, you need to use an access point.

Service Set Identifier (SSID)

The Service Set Identifier is the ID used to form a wireless network. You can set up to 32 characters in the SSID field. An identifier attached to packets sent over the wireless LAN functions as a password for joining a particular wireless network (BSS). All wireless devices and access points within the same BSS must use the same SSID. The SSID is also referred to as the network name because it is an identifying label for a wireless network.

Channels

There are several channels specified in the 802.11a/b/g standard for wireless communications. The number of available channels authorized for use may be restricted based on your location (generally regulatory domain). See Appendix for available channels at your location. When shipped from the factory, the Samsung Wireless Network Printer Card is configured for Ad-hoc mode using the automatic channel selection. In most cases, manual configuration of the channel is not required. If the print server discovers a wireless network that has the same SSID and operation mode when powered up, it will automatically adjust the channel to match that network.

IEEE 802.11 authentication

IEEE 802.11 authentication is a process of identifying an individual who is attempting to access a wireless LAN or an access point. The IEEE 802.11 standard defines two types of authentication services:

- **Open System:** Authentication is not used, and encryption may or may not be used, depending on the need for data security.
- **Shared Key:** Authentication is used. A device that has a proper WEP key can access the network.

The Samsung Network Printer Card supports both authentication methods.

WEP encryption

WEP (Wired Equivalent Privacy) is a security protocol preventing unauthorised access to your wireless network. Wireless LANs, which communicate over radio waves, do not have a physical structure that can be protected from unauthorised access and therefore are vulnerable to tampering. WEP is designed to provide a wireless LAN with a security level equal to that found on a wired network. WEP encrypts the data portion of each packet exchanged on a wireless network using a 64-bit or 128-bit WEP encryption key. Sometimes, 64-bit WEP is called 40-bit and 128-bit is called 104-bit. 40-bit and 64-bit encryption are really the same thing, as are 104-bit and 128-bit encryption, because an additional 24 initialisation vector (IV) bits are automatically added to make a total of 64 bits and 128 bits. To encrypt data, the Samsung Wireless Network Printer Card uses four encryption keys. You must select a key and enter the key value. The key value must be the same as the other wireless devices or that of the access point of your wireless network. In 64-bit mode, each key value is 10 hexadecimal digits (0-9 and A-F) or 5 alphanumeric characters. In 128-bit mode, each key value is 26 hexadecimal digits or 13 alphanumeric characters. Contact your network administrator for this configuration.

IEEE 802.1x

IEEE 802.1x uses EAP (Extensible Authentication Protocol) and an authentication server, such as RADIUS (Remote Authentication Dial In User Server, RFC2138) for client and network server authentication. In this authentication process, the authentication server verifies the identity of the party attempting to connect to the network. The Samsung Wireless Network Printer Card supports popular authentication methods based on EAP, including:

- **EAP-MD5** (EAP using Message Digest Algorithm 5): EAP-MD5 uses a password protected by the MD5 encryption algorithm, which is the same challenge handshake protocol as PPP-based CHAP. This authentication method provides one-way authentication based on a user name and password. This implementation is useful only in a small private network because it does not support automatic key distribution.

- **EAP-MSCHAPv2:** EAP-MSCHAPv2 uses the MS-CHAPv2 authentication protocol to create a strong encryption key initially for MMPE (Microsoft Point-to-Point Encryption) and to use a different encryption key during communication.
- **EAP-TLS** (EAP using Transport Layer Security): EAP-TLS uses X.509-compliant digital certificates for both client and server authentication.
- **EAP-TTLS:** EAP-TTLS is known as a Tunneled TLS (Transport Layer Security) protocol. It is designed to provide authentication that is every bit as strong as EAP-TLS, but it does not require that each user be issued a certificate. Instead, only the RADIUS authentication servers are issued certificates. User authentication is performed by a password. The password credentials are transported in a securely encrypted tunnel that is established using the server certificate. As a result, the credentials are not vulnerable to dictionary attacks. Using TTLS forwarding, any inner authentication requests that are found inside the TTLS tunnel, such as EAP, PAP, CHAP, or MS-CHAP-V2, can be processed by downstream RADIUS servers. In this manner, you can perform authentication against any RADIUS infrastructure that is already deployed in your organisation.
- **PEAP** (Protected Extensible Authentication Protocol): PEAP uses digital certificates for network server authentication and a password for client authentication.

WPA (Wi-Fi Protected Access)

WPA, announced by Wi-Fi Alliance, authorises and identifies users based on a secret key that changes automatically at regular intervals. WPA uses 802.1x or WPA-PSK (WPA mode Pre-Shared Key) for authentication. WPA-PSK verifies users via a pre-shared key on both a client station and an access point. In WPA-PSK authentication, a client may only gain access to the network if the client's password matches the access point's password. WPA also uses TKIP (Temporal Key Integrity Protocol) and AES (Advanced Encryption Standard) for data encryption.

Certificates

Certificates are used to validate the identity of clients and network servers and allow encrypted data communications for EAP/802.1x authentication. Certificates may be issued and signed by a trusted third party, called Certificate Authority (CA). In EAP/802.1x authentications, such as EAP-TLS, EAP-TTLS, and PEAP, the Samsung network print server may require one or both of the following certificates:

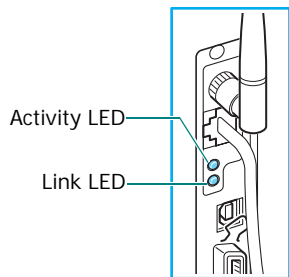
- **Root Certificate:** A certificate from a trusted Certificate Authority (CA) is used to validate the identity of a network authentication server while EAP authentication methods, such as EAP-TLS, EAP-TTLS, and PEAP, are performed. The network authentication server's identity will be validated when the root certificate information installed on the Samsung network print server is identical to the information on a certificate received from the network authentication server, such as RADIUS. To be installed on the Samsung

Network Printer Card, a root certificate must be in the form of Base64 Encoded X.509 with a .cer extension and be less than 3,072 bytes.

- **Client Certificate:** A client certificate is used to validate the identity of the Samsung Network Printer Card from a network authentication server, such as RADIUS, while the EAP-TLS authentication method is performed. To be installed on the Samsung Network Printer Card, a client certificate must be in the form of PKCS #12 / Personal Information Exchange with a .pfx extension and be less than 3,072 bytes.

Before configuring the print server

The Samsung Wireless Network Printer Card has two LEDs to show the network connection status. When you configure the wireless settings on your print server, please refer to these LEDs to make sure that a network connection is functioning.



LED	Status	Description
Activity LED	Off	Power off or system error
	On	System error
	Blinking	Normal
Link LED	Off	Not linked to a network
	Green on	Linked to a wired LAN
	Red on	Linked to a wireless LAN.
	Orange on	Linked to both wired and wireless LANs.

NOTE: If the operation mode is set to Ad hoc and the Link LED lights red, it means that the print server is or can be another Ad hoc station.

You can check the current network settings with the Network Configuration page. For details, please refer to the printer user's guide.

- Check for the currently selected operation mode: Ad hoc or Infrastructure
- Check for the SSID. Make sure that the print server SSID matches the SSID of the network. The SSID is case-sensitive.
- Check for the **Line Quality** item on the Network Printer Card Test page. If the quality is low or very low, improve the quality of network connections by removing obstacles, moving the wireless device closer to the printer, or adjusting the antenna direction.

Wireless settings

The Samsung network print server provides two solutions to configure wireless network settings:

- **SyncThru Web Service:** This method is suitable for users who can use a wired network. In order to use this method, you must connect the Samsung print server to a local network using an Ethernet cable.
- **Printer control panel:** This method is suitable for users who can use the printer control panel menus. To use this method, refer to the printer user's guide.

Configuration explained in this sections is based on SyncThru Web Service. Before configuring wireless network parameters, make sure of the following, depending on your situation:

- The Wireless Printer Network Card and antenna are installed in the print server. If they are not, the **Wireless** menu will not be displayed on SyncThru Web Service.
- Connect the Samsung print server to your wired network using an Ethernet cable.
- The print server's IP address is configured as an IP address available on your network.

To access SyncThru Web Service:

- 1 Run your web browser.
- 2 Enter the print server's IP address in the URL field and click **Go**.
- 3 Select **Network Settings** → **Wireless**.

Wireless basic settings

These are the basic parameters required to make wireless connections found on the **Wireless** page of SyncThru Web Service. Click **Apply** after changing parameters.

- **SSID:** SSID (Service Set Identifier) is a name that identifies a wireless network. Access points and wireless devices attempting to connect to a specific wireless network must use the same SSID. The SSID is case-sensitive.
- **Operation Mode:** Operation Mode refers to the type of wireless connections. Choose one of the following options:
 - **Ad hoc:** allows wireless devices to communicate directly with each other in a peer-to-peer environment.
 - **Infrastructure:** allows wireless devices to communicate with each other through an access point.
- **Frequency Mode:** Choose a frequency mode. The Samsung print server supports 802.11a, 802.11b, and 802.11g frequency modes.
 - **802.11a (5GHz) mode:** Data is sent using IEEE802.11a standard communications in the 5 GHz band.
 - **802.11b/g (2.4GHz) mode:** Data is sent using IEEE802.11g standard communications in the 2.4 GHz band. This mode is compatible with IEEE802.11b standard.
 - **802.11a, b/g (5GHz, 2.4GHz) mode:** Data is sent using the frequency range defined in both IEEE802.11a and IEEE802.11g standards.
- **Ad hoc Channel:** Change the channel selection setting. If you select **Auto Setting**, the Samsung print server will automatically adjust channels. To manually set a channel, select **Channel Selection**. In most cases, manually setting up channels is not required.
- **Connection Status:** This section displays information on the current wireless connection.
 - **Link Status:** indicates whether or not the WLAN interface is connected to other wireless devices.
 - **Associated Frequency:** indicates the associated frequency mode, for example, 802.11a.
 - **BSSID:** displays the associated BSSID, for example, 00:02:78:E3:43:89.
 - **Link Quality:** represents quality of the wireless link between the print server and an access point or other devices by percentage, for example, 100%
 - **Current Tx Rate:** is automatically determined by radio transmission speed, for example, 54 Mbps.
 - **Current Channel:** represents the associated channel, for example, [149] 5745 MHz.

NOTE: Your wireless basic setting changes will be applied after the print server restarts. In order to restart the print server, from SyncThru Web Service, select **Network Settings** → **Reset** and click **Restart**, or turn the print server off and then back on.

Wireless security settings

This section describes how to configure wireless security for your wireless network. The Samsung Network Printer Card supports several security features, such as static WEP, IEEE 802.1x, and WPA, to protect your network from unauthorised access, and provides three security modes:

- **None:** This is used when the validation of a wireless device's identity and data encryption are not required for your network. Open system is used for IEEE 802.11 authentication.
- **Static WEP:** This uses the WEP (Wired Equivalent Privacy) algorithm suggested by IEEE 802.11 standard for security. Static WEP security mode requires a proper WEP key for data encryption, decryption, and IEEE 802.11 authentication.
- **Enhanced Security:** This provides more advanced security and better key management than Static WEP by using IEEE 802.1x EAP authentication, WPA-PSK, and dynamic encryption, such as dynamic WEP, TKIP, and AES. In Enhanced Security mode, there are four authentications, depending on WPA authentication and 802.1x authentication:
 - **WPA-PSK authentication:** You can select WPA-PSK to authenticate the print server based on WPA Pre-Shared Key. This uses a shared secret key (generally called Pre-Shared Key passphrase) that is manually configured on the access point and each of its clients. This is suitable for users who want to use WPA but do not have a RADIUS server installed on their network.
 - **EAP-TLS authentication:** EAP-TLS uses X.509-compliant digital certificates for both client and network server authentications. Root certificates and client certificates must be installed on the print server.
 - **EAP-TTLS authentication:** EAP-TTLS uses an X.509-compliant digital certificate for network server authentication. This also requires a 802.1x user name, user password, and a TTLS identity used by inner authentication protocols for client authentication over a secure connection.
 - **PEAP authentication:** PEAP is similar to EAP-TTLS. This also uses an X.509-compliant digital certificate for network server authentication and requires an 802.1x user name and user password used by inner authentication protocols for client authentication over a secure connection.

Additionally, you may configure the related parameters to use a special security mode. The following table summarises the security modes and authentication options available on the Samsung network print server and describes the features of each option:

Security mode	Authentication method employed	Encryption method employed
None	Open System	No encryption

Security mode	Authentication method employed	Encryption method employed
Static WEP	Open System, Shared key, or optionally 802.1x authentication (EAP-MD5 or EAP-MSCHAPv2) if needed.	Static WEP encryption
Enhanced Security	WPA-PSK	Using dynamic key management TKIP, and AES
	EAP-TLS	Using dynamic key management TKIP, AES, 64-bit WEP, and 128-bit WEP
	EAP-TTLS	Using dynamic key management TKIP, AES, 64-bit WEP, and 128-bit WEP
	PEAP	Using dynamic key management TKIP, AES, 64-bit WEP, and 128-bit WEP

NOTE: The Samsung network print server provides “None” and Static WEP without 802.1x authentication in Ad hoc mode while “None,” Static WEP with 802.1x authentication, and Enhanced security are provided in Infrastructure mode.

You may first choose one of the security modes and configure additional parameters for each security mode.

“None” security mode settings

This uses Open System for IEEE 802.11 authentication and doesn't require additional parameter settings.

Static WEP security mode settings

To use Static WEP, you need to configure the following parameters:

- **IEEE 802.11 Authentication:** Choose one of the following IEEE 802.11 authentications:
 - **Open System:** This is used if your wireless network does not require authentication for network access. However, your network may still use encryption keys for data security.
 - **Shared Key:** Use Shared Key authentication if your network requires that each device be configured with the same secret WEP key for network access.

- **WEP Encryption:** Choose either 64-bit WEP or 128-bit WEP. If your network uses WEP encryption keys, you must configure the encryption keys.
- **Key 1/2/3/4:** You need to specify a static WEP encryption key if your network uses WEP encryption keys. You can configure up to four keys. The active key (called using key) must match the value and active key position (for example, Key 1) configured on other wireless devices. The appropriate key size must be configured according to the WEP key entry format and the WEP encryption key type. The following table shows how to configure encryption keys using HEX or ASCII values.

Key	Hexadecimal format	ASCII format
64-bit WEP	10 digits (0~9, A~F)	5 alphanumeric characters
128-bit WEP	26 digits (0~9, A~F)	13 alphanumeric characters

- **802.1x Authentication:** Choose one of the IEEE 802.1x authentications: None, EAP-MD5, or EAP-MSCHAPv2.
- **User Name:** 802.1x EAP authentication methods, such as EAP-MD5, EAP-MSCHAPv2, EAP-TTLS, and PEAP, require an EAP user name as an account name. A user name consisting of up to 31 characters is necessary, if 802.1x authentication is enabled. This is not saved as the default value.
- **User Password:** 802.1x EAP authentication methods, such as EAP-MD5, EAP-MSCHAPv2, EAP-TTLS, and PEAP, require an EAP user password as an account password. A password consisting of up to 15 characters is necessary, if 802.1x authentication is enabled. This is not saved as the default value.

Enhanced Security mode settings

- **WPA authentication:** WPA supports WPA-PSK and IEEE 802.1x for authentication. Choose either authentication method.
- **Encryption:** Choose one of the encryption key types: TKIP, AES, 64-bit WEP, or 128-bit WEP. WPA supports TKIP and AES for data encryption.
- **WPA Shared Key:** If you are using WPA-PSK, the print server WPA shared key must be the same as that of an access point. The WPA shared key is used to authenticate and to create a master session key.
- **802.1x Authentication:** You must select an authentication method which is supported by a RADIUS server. The authentication method is determined by negotiation between clients and the server. Therefore, it is not necessary for the selected authentication to be higher priority on a RADIUS server. Available authentications are NONE, EAP-MD5, EAP-MSCHAPv2 in 802.1x Authentication on Static WEB security.

- **Inner Authentication Protocol:** EAP-TTLS and PEAP allow for standard RADIUS protocols within their inner tunnel. User authentication is performed by a password. The password credentials are transported in a securely encrypted tunnel that is established using the server certificate. EAP-TTLS supports EAP-MD5, CHAP, MS-CHAP, and MS-CHAPv2. PEAP supports EAP-MD5 and MSCHAPv2 as inner authentications.

- **Identity Name:** EAP-TTLS has a unique feature, TTLS Identity, that other EAP authentication protocols do not offer. It passes your user name through an encrypted tunnel (generally called tunneled TLS) as your credentials. It uses TTLS Identity as your credentials before the encrypted tunnel is created.

- **User Name:** 802.1x EAP authentication methods, such as EAP-MD5, EAP-MSCAHPv2, EAP-TTLS, and PEAP, require an EAP user name as an account name. A user name is necessary, if 802.1x authentication is enabled. This is not saved as the default value.

- **User Password:** 802.1x EAP authentication methods, such as EAP-MD5, EAP-MSCAHPv2, EAP-TTLS, and PEAP, require an EAP user password as an account password. A user password is necessary, if 802.1x authentication is enabled. This is not saved as the default value.

- **Root certificate:** You can install a root certificate. To be installed on the Samsung Wireless Network Printer Card, a root certificate must be in the form of Base64 Encoded X.509 with a .cer extension and be less than 3,072 bytes. EAP-TLS, EAP-TTLS, and PEAP authentications need root certificates.

1. Click **Configure**.

If the root certificate has been configured, detailed information on the root certificate displays.

2. Select the root certificate file.

3. Upload the file and click **back** to return to the front page.

- **Client certificate:** You can install a client certificate. To be installed on the Samsung Wireless Network Printer Card, a client certificate must be in the form of PKCS #12 / Personal Information Exchange with a .pfx extension and be less than 3,072 bytes. EAP-TLS authentication needs a client certificate.

1. Click **Configure**.

If the client certificate has been configured, detailed information on the client certificate displays.

2. Select the client certificate file.

3. Upload the file and click **back** to return to the front page.

NOTE: You can make a certificate into a file using Windows Console:

1. From the Windows Start menu, select **Run**.
2. Enter **mmc** in the Run dialogue box.
3. Select **File → Add/Remove Snap-in**.
4. Click **Add**, select **Certificate**, and then click **Add**.
5. In the Certificate Snap-in dialogue box, select **Computer Account** and click **Next → Finish → Close → OK**.
6. Select the certificate you want to change to a file.
 - When making a root certificate, select one of the certificates in the trusted root certificate authority folder.
 - When making a client certificate, select one of the certificates in the personal folder.
7. Right-click the certificate and select **All task → Export**.
8. In the Certificate Export wizard, click **Next**.
9. Select **DER encoded X.509 Binary (.cer)** for a root certificate, or **PKCS #12 (.PFX)** for a client certificate, and click **Next**.
10. Enter a file name and click **Next**.
11. Click **Finish** to close the wizard.

- **Enable Server certificate Validation:** This option determines whether or not the client authenticates the server. If Server Certificate Validation is disabled, EAP-TTLS and PEAP authentication do not require a root certificate.

In Enhanced Security mode, four authentications are provided according to WPA authentication and 802.1x authentication. To use each authentication in Enhanced Security mode, perform the following steps:

Using WPA-PSK

- 1 Set Security Mode to **Enhanced Security**.
- 2 Set WPA Authentication to **WPA-PSK**.
- 3 Choose **TKIP** or **AES** for encryption. The same encryption algorithm must be configured on the access point.
- 4 Enter the WPA Shared Key as the secret key. The same WPA Shared Key must be configured on the access point.

Using EAP-TLS

- 1 Set Security Mode to **Enhanced Security**.
- 2 Set WPA Authentication to **IEEE802.1x**.
- 3 Set 802.1x Authentication to **EAP-TLS**.
- 4 Choose **TKIP**, **AES**, **64-bit WEP**, or **128-bit WEP** for encryption. The same encryption algorithm must be configured on the access point.

- 5 Install a root certificate. A root certificate must be issued by the Certificate Authority (CA) who signed the authentication server's certificate and be in the form of Base64 Encoded X.509 with a .cer extension. It must also be less than 3,072 bytes.
- 6 Install a client certificate. A client certificate must be issued by the trusted Certificate Authority (CA) and is used for the RADIUS server to validate print server's identity. It must be in the form of PKCS #12 / Personal Information Exchange with a .pfx extension and be less than 3,072 bytes. You also need to enter the same private key password used when a client certificate is issued by CA.

Using EAP-TTLS

- 1 Set Security Mode to **Enhanced Security**.
- 2 Set WPA Authentication to **IEEE802.1x**.
- 3 Set 802.1x Authentication to **EAP-TLS**.
- 4 Choose **TKIP, AES, 64-bit WEP**, or **128-bit WEP** for encryption. The same encryption algorithm must be configured on the access point.
- 5 Choose **EAP-MD5, CHAP, MS-CHAP**, or **MS-CHAPv2** for inner authentication protocol. The selected inner authentication protocol must be supported by the RADIUS server.
- 6 Set an Identity name of up to 31 characters as another identity name.
- 7 Set a user name of up to 31 characters. This account name must also be set up on the RADIUS server.
- 8 Set a user password of up to 15 characters. This account password must also be set up on the RADIUS server.
- 9 Select or deselect **Enable Server Certificate Validation**. If this option is deselected, the print server always regards the RADIUS server as a valid authentication server without a root certificate.
- 10 Install a root certificate. A root certificate must be issued by the Certificate Authority (CA) who signed the authentication server's certificate and be in the form of Base64 Encoded X.509 with a .cer extension. It must also be less than 3,072 bytes. If you deselect **Enable Server Certificate Validation**, you don't need to install a root certificate.

Using PEAP

- 1 Set Security Mode to **Enhanced Security**.
- 2 Set WPA Authentication to **IEEE802.1x**.
- 3 Set 802.1x Authentication to **EAP-TLS**.

- 4 Choose **TKIP, AES, 64-bit WEP**, or **128-bit WEP** for encryption. The same encryption algorithm must be configured on the access point.
- 5 Choose **EAP-MD5** or **MS-CHAPv2** for inner authentication protocol. The selected inner authentication protocol must be supported by the RADIUS server.
- 6 Set a user name of up to 31 characters. This account name must also be set up on the RADIUS server.
- 7 Set a user password of up to 15 characters. This account password must also be set up on the RADIUS server.
- 8 Select or deselect **Enable Server Certificate Validation**. If this option is deselected, the print server always regards the RADIUS server as a valid authentication server without a root certificate.
- 9 Install a root certificate. A root certificate must be issued by the Certificate Authority (CA) who signed the authentication server's certificate and be in the form of Base64 Encoded X.509 with a .cer extension. It must also be less than 3,072 bytes. If you deselect **Enable Server Certificate Validation**, you don't need to install a root certificate.

NOTE: Your wireless basic setting changes will be applied after the print server restarts. In order to restart the print server, from SyncThru Web Service, select **Network Settings** → **Reset** and click **Restart**, or turn the print server off and then back on.

7 Appendix

Specifications

Items	Specifications
Supported networks	<ul style="list-style-type: none"> Windows: 98, NT, ME, 2000, XP, 2003 Linux: Red Hat 8.0 ~ 9.0, Fedora Core 1 ~ 3, Mandrake 9.0 ~ 10.2, SuSE 8.2 ~ 9.2 Unix: AT&T system V (Rel 4.2), BSD4.3, HP-UX (Rel 9.x & Rel 10.x), SCO 5.x, SUNOS 5.5, Sparc or Solaris 2.5. Novel NetWare: NetWare versions 3.x, 4.x, 5.x, 6.x Macintosh: Macintosh 8.6 ~ 9.2, 10.1 ~ 10.3, or higher
Protocol	TCP/IP, LPD (LPR), IPP, IPX/SPX, EtherTalk, Bonjour.
Configuration utilities	SetIP, SyncThru Web Service, SyncThru Web Admin Service
Hardware requirements	<ul style="list-style-type: none"> PC: <ul style="list-style-type: none"> - 80486 CPU or higher - Minimum of 16 MB of RAM - 2 MB of free disk space Macintosh: <ul style="list-style-type: none"> - PowerPC 68020 or higher - Minimum of 8 MB of RAM - 2 MB of free disk space
Wireless interface	IEEE 802.11a/b/g standard

Wireless specifications

Items	Specifications	
Frequency band*	Americas	2.412 ~2.462GHz 5.180 ~ 5.320GHz 5.745 ~ 5.825GHz
	Europe	2.412 ~2.472GHz 5.180 ~ 5.320GHz
	Asia-Pacific	2.412 ~2.472GHz 5.745 ~ 5.805GHz
Spread spectrum method	802.11a mode	OFDM
	802.11b mode	DSSS
	802.11g mode	OFDM
Data transfer rate	802.11a mode**	54, 48, 36, 24, 18, 12, 9, 6Mbps
	802.11b mode	11, 5.5, 2, 1Mbps
	802.11g mode***	54, 48, 36, 24, 18, 12, 9, 6Mbps

* Subject to local regulatory

** 802.11a mode is supported only when connecting with IEEE 802.11a adapter

***802.11g mode is supported only when connecting with IEEE 802.11g adapter

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This product includes cryptographic software written by Eric Young (ey@cryptsoft.com).

This product includes software written by Tim Hudson (tjh@cryptsoft.com).

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